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|--|-------------|----------------------|---------------------|------------------|
| 10/511,927 | 05/06/2006 | Maolin Long | 21370/0212234-US0 | 2021 |
| 85854 7590 10/20/2009 Huawei Technologies Co., Ltd. c/o Darby & Darby P.C. P.O. Box 770 Church Street Station New York, NY 10008-0770 | | | | |
| EXAMINER | | | | |
| FLORES, LEON | | | | |
| ART UNIT | | PAPER NUMBER | | |
| 2611 | | | | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/511,927

Applicant(s)

LONG, MAOLIN

Examiner

LEON FLORES

Art Unit

2611

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 July 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 is/are rejected.
- 7) ☒ Claim(s) 2-10 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 July 2009 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/CDC)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____
- Paper No(s)/Mail Date _____

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claim 1 have been considered but are moot in view of the new ground(s) of rejection.

Drawing Objections

Applicant asserts that *"Objection has been made to Figs. 1-2. The attached replacement sheet adds the legend "Prior Art" to Figs. 1-2. Reconsideration and withdrawal of the objection to Figs. 1-2 is respectfully requested"*.

The examiner agrees.

Claim Objections

Applicant further asserts that *"The boxes in claim 4 are replaced with "" to correct minor editorial problems. The support for the amendment can be found at page 12, lines 5-6 of the application as originally filed. The boxes in claim 6 are replaced with "" to correct minor editorial problems. The support of the amendment can be found at page 18, lines 10-17 of the application originally filed. The boxes in claim 7 are replaced with "+" to correct minor editorial problems. The support for the amendment can be found at page 15, lines 4-6 of the application as originally filed. Reconsideration and withdrawal of the objection to claims 4, 6 and 7 is respectfully requested"*.

The examiner agrees.

Rejections Under 35 U.S.C. § 112

Applicant further asserts that *"In amended claim 1, "the neural network model" in line 5 is replaced with "a neural network model," "the expected output value" in line 7 is replaced with "an expected output value," and "the specified criterion" in line 10 is replaced with "a specified criterion." After the amendment, claim 1 meets the requirements of 35 USC §112. In amended claim 2, "i.e., the actual output value of the RF power amplifier corresponding to the input signal" is deleted. After the amendment, claim 2 meets the requirements of 35 USC § 112. Consequently, Claims 3-10 meet the requirements of 35 USC §112 after the amendments of claims 1 and 2. Reconsideration and withdrawal of the rejection of claims 1-10 under 35 U.S.C. § 112, second paragraph is respectfully requested'.*

The examiner agrees.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. **Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bruce**

E. Watkins et al (hereinafter Watkins) "Neural Network Based Adaptive

Predistortion For The Linearization Of NonLinear RF Amplifiers" IEEE 1995 in

view of Changsoo Eun et al (hereinafter Eun) "Utilization of Neural Network Signal

Processing in the Design of a Predistorter for a Nonlinear Telecommunication

Channel" IEEE 1994.

Re claim 1, Watkins discloses a BDPD-based (Base-band Digital Pre-Distortion) method for improving efficiency of an RF power amplifier, comprising: (1) Determining structural parameters of a neural network as required and establishing the neural network, inputting modeling data and initial values of network parameters required for establishing a neural network model of the RF power amplifier (See section 3); (2) Propagating forward with the input data and network parameters, calculating the difference between output value of the neural network and an expected output value, then propagating backward along the neural network with said difference to correct the network parameters (See section 3); (4) Solving a pre-distortion algorithm of the RF power amplifier with said neural network model (See section 3); (5) Carrying out pre-distortion processing for input signal of the RF power amplifier with said pre-distortion algorithm and then feeding the processed input signal to the RF power amplifier. (See section 3)

But the reference of Watkins fails to explicitly teach (3) Determining whether said difference meets a specified criterion; if so, outputting the neural network model of the RF power amplifier and going to step (4), otherwise inputting the corrected network parameters to the neural network and going to step (2).

However, Eun does. (See section 2 "training session") Eun discloses a Neural network signal processing in the design of a Predistorter wherein suggesting the teaching of (3) Determining whether said difference meets a specified criterion; if so, outputting the neural network model of the RF power amplifier and going to step (4) ("after training network A is removed from system and the predistorter alone works as a nonlinear compensater"), otherwise inputting the corrected network parameters to the neural network and going to step (2).("the overall output should approach the input as closely as possible, the error approaches the optimum value")

Therefore, taking the combined teaching of Watkins and Eun as a whole, it would have been obvious to one of ordinary skills in the art to incorporate this feature into the system of Hua, in the manner as claimed and as taught by Eun, for the benefit of designing the neural network predistorter.

5. **Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bruce E. Watkins et al (hereinafter Watkins) "Predistortion Of NonLinear Amplifiers Using Neural Networks" IEEE 1996 in view of Song et al. (hereinafter Song) (US Patent 7,333,559 B2)**

Re claim 1, Watkins discloses a BDPD-based (Base-band Digital Pre-Distortion) method for improving efficiency of an RF power amplifier, comprising: (1) Determining structural parameters of a neural network as required and establishing the neural network, inputting modeling data and initial values of network parameters required for establishing a neural network model of the RF power amplifier (See section 4); (2) Propagating forward with the input data and network parameters, calculating the difference between output value of the neural network and an expected output value, then propagating backward along the neural network with said difference to correct the network parameters (See section 4); (4) Solving a pre-distortion algorithm of the RF power amplifier with said neural network model (See section 4); (5) Carrying out pre-distortion processing for input signal of the RF power amplifier with said pre-distortion algorithm and then feeding the processed input signal to the RF power amplifier. (See section 4)

But the reference of Watkins fails to explicitly teach (3) Determining whether said difference meets a specified criterion; if so, outputting the neural network model of the RF power amplifier and going to step (4), otherwise inputting the corrected network parameters to the neural network and going to step (2).

However, Song does. (See figs. 2-3 & col. 7, lines 20-23, col. 8, lines 4-32) Song discloses a digital Predistorter wherein suggesting the teaching of (3) Determining whether said difference meets a specified criterion; if so, outputting the neural network model of the RF power amplifier and going to step (4) ("LUT convergence"), otherwise

inputting the corrected network parameters to the neural network and going to step (2). ("LUT convergence")

Therefore, taking the combined teaching of Watkins and Song as a whole, it would have been obvious to one of ordinary skills in the art to incorporate this feature into the system of Watkins, in the manner as claimed and as taught by Song, for the benefit of providing compensation.

Allowable Subject Matter

6. Claims (2-10) are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Contact

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LEON FLORES whose telephone number is (571)270-1201. The examiner can normally be reached on Mon-Fri 7-5pm Alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Payne can be reached on 571-272-3024. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/L. F./
Examiner, Art Unit 2611
October 13, 2009

/David C. Payne/
Supervisory Patent Examiner, Art Unit 2611